***NEGOTIATE* Toolkit:**

Case Studies

Sharing Irrigation Water in Bhutan: Companion Modeling for Conflict Resolution and Promoting Collective Management

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1. Background

In the Lingmuteychu watershed of west central Bhutan, a limited volume of water is available at rice transplanting in June-July and must be shared among farmers from seven staggered villages. Because of the high elevation, they have only a few weeks to establish this essential crop on time. But because of recent changes in the local farming circumstances, like the introduction of cash and double cropping systems, the customary rights for allocating irrigation water are no longer adapted. With traditional norms weakening, in recent years villagers have been fighting over water.

2. The negotiation approach

The companion modelling (ComMod, http://www.commod.org) approach was used to facilitate water management negotiations in the watershed between 2003 and 2005. The general objective of ComMod is to facilitate dialogue, shared learning, and collective decision making through interdisciplinary and integrative research to strengthen the adaptive management capacity of local communities and stimulate collective action. It uses role-playing games (RPGs) and agent-based computer models (ABM) to allow participants to explore different scenarios. The aim in Bhutan was to provide a non threatening virtual environment in which the farmers could make water-related decisions that are similar to reality and able to be role-played.

The ComMod approach was first used with the two uppermost villages in the watershed, and later among the seven villages during a series of three field workshops. The first role-playing game (RPG) was used in May 2003 to represent the current conflict situation and to facilitate the sharing of knowledge and perceptions among different types of farmers in the two village communities, and between the farmers, local development workers and researchers. Different sessions of the RPG were played, with farmers first playing within their villages, then with communication encouraged between villages, and finally where villagers swapped their roles. The effects of these different modes of communication on the management of the resource (volumes of shared water and water in excess) and rice production (number of fallowed plots) were displayed. Afterwards farmers reported that they had a much better understanding of the other party's circumstances and reasons for their behaviour, and of the importance of water sharing among types of households and between villages.

As they played, stakeholders helped to validate and improve the model behind the role playing game, in terms of its set-up, behavioural rules (they requested to include the possibility to exchange labour for water) and interactions, so that it accurately reflected the real situation. It was then relatively easy to translate the RPG into a computerized multi-agent model focusing on the interactions among different actors (or 'agents') and between these actors and the common resource to be shared. The ABM model allowed rapid simulation of a more comprehensive set of scenarios of water sharing rules by the researchers and the selection of the most promising ones to be explored

with stakeholders. The simulations showed that the behaviour of the hydrosystem (amount of unused water and water sharing) was more sensitive to water exchange protocols (i.e. whether water was shared with kin, shared more broadly for free, or exchanged for labour or cash) than to rainfall patterns (low or high) or types of social networks (i.e related by kin, members of same village, members of neighbouring village).

During interviews after the RPG sessions, players indicated that their knowledge and understanding of water sharing increased significantly and there was clear agreement on the need to change the current water sharing rules. The RPG was therefore instrumental in mobilizing the communities in conflict, building collective learning, and paving the way for joint decision-making for fairer water sharing.

At the end of the second RPG workshop in December 2003, the participants reached two important decisions related to developing an efficient and equitable water-sharing system. First, they agreed that the upper village would release irrigation water 5 days earlier than done per the traditional system. They further agreed on the need to establish an institution to promote and oversee watershed management.

However, in the following transplanting season, the downstream farmers were surprised to find the people of the upstream village unwilling to change the water release date. Although they acknowledged that the issue had been discussed and resolved, they claimed a legal agreement should have been signed in December.

Based on these preliminary encouraging results and at the request of research managers in the Ministry of Agriculture in Thimphu, a third workshop was therefore implemented in April 2005 with representatives from all seven villages of the watershed to out-scale this approach at the whole watershed level. A new RPG was designed to fit with this scale and used to emphasize the importance of collective water management at the whole catchment level. After a session based on individual village level water management, players were seated at a long “upstream to downstream” table and had to decide how to use fixed amounts of irrigation water during the establishment of their rice crops.

The objectives of this third workshop were to:

- facilitate exchanges among the seven villages regarding natural resource management at the watershed level,
- enhance the stakeholders’ understanding of the resource use dynamics at the watershed level, and
- define the next steps toward the establishment of a formal watershed management committee before late 2005, and plan several short-term priority actions in integrated natural resource management.

The RPG was designed using three scenarios to provide different settings for players to interact and generate new ideas to cope with the emerging situation. The first scenario best reflected the current situation, where farmers only communicated with other farmers in their village. In the second scenario, farmers were able to discuss water sharing with neighbouring villages to promote collective decision making. In the third scenario, farmers swapped roles to better appreciate the situation faced by others. The scenarios were interspersed with plenary discussions which in part offered opportunities for players to discuss critical issues regarding watershed management.

At the end of the 2005 workshop, participants agreed to establish a watershed institution – the Watershed Management Committee (WMC) with associated constitution and by-laws. All the workshop participants (three representatives from the 7 villages, as well as village headmen, deputy

and accountant of the local development office) signed a pledge to work collectively to manage the resources of the watershed for present and future benefits. The participants also agreed to immediately undertake collective actions including protection of spring-water sources, rehabilitation of an abandoned irrigation channel and related rice terraces and construction of small ponds to store water in each village.

The constitution and by-laws for the Lingmuteychu Watershed Management Committee were developed during the following months by a drafting committee comprised of representatives from all villages together with a facilitator from the local research agency. In November 2005, the draft constitution was presented to the community and the committee was formally instituted. A 3-day participatory workshop was organized to finalize the constitution and by-laws. The Lingmuteychu Watershed Management Committee was formally established and the by-laws were signed by representatives of the seven villages and the headman, deputy and accountant of the local development office.

Thanks to the support of the local research agency, this watershed management committee has been operating on the basis of quarterly meetings since its inception and was able to secure funding to rehabilitate irrigation channels, build small ponds, plant trees on steep slopes, and reinforce community forestry activities. During the 2007 wet season, abandoned terraces of the Lumpa hamlet were planted to rice again and more paddies are being rehabilitated in 2008.

Through the use of mediation tools like RPGs and ABMs, the ComMod methodology helped to mitigate the conflict over the sharing of irrigation water by succeeding in bringing the different parties in conflict to a negotiation platform, introducing a collective learning process, establishing concrete agreements, and creating an institution for collective watershed management.

3. Lessons learned

Key lessons from the process included:

for the participants:

- The game setting promoted dynamic and non threatening discussions among the conflicting parties.
- It was only after the game session that the real implications of the game were realized; thus, the spontaneous actions and reactions generated new ideas that otherwise would not have emerged.
- The plenary sessions, gave a much-needed formal setting for concrete discussions on the outcomes of the RPG and for decision making.
- Players could use the RPG as means of communicating with their counterparts.
- The RPG seems, at first, like child's play, but it becomes a very strong tool to study complex interactions and dynamics.

for the designers and facilitators:

- Alternating game sessions with plenary sessions and individual interviews allows people to relate the game to their real-life situation.

- Some local experience and knowledge is necessary in order to be able to facilitate the process. The facilitator must be trusted.
- There is a definite need for skill to observe the participants' behaviours and facilitate the process.
- The RPG can be used as a platform for conflict transformation and mitigation.
- Mismanagement of the game can lead to a chaotic situation.
- The RPG effectively provides equal opportunities for all strata of players to participate in the gaming session and its exchanges of information, knowledge and points of view.
- It helps ordinary people put the NRM issues or problem in the right context for developing an appropriate and acceptable strategy to address the problem.

For more information visit the following websites at: http://www.cpwf25.sc.chula.ac.th, www.ecole-commod.sc.chula.ac.th and www.commod.org

See also the following papers:

Gurung, T. R., F. Bousquet, and G. Trébuil. 2006. Companion modeling, conflict resolution, and institution building: sharing irrigation water in the Lingmuteychu Watershed, Bhutan. Ecology and Society 11(2): 36. http://www.ecologyandsociety.org/vol11/iss2/art36/

Bousquet F., Raj Gurung T., and G. Trébuil. 2005. The game of life: a fresh approach to the challenge of sharing agricultural resources has farmers playing games with scientists. Rice Today, IRRI, Los Baños, Laguna, Philippines 4(1): 25-27.

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